IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Appellant(s):	Hardjono et al.	Examiner:	Choudhury

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Title : System, Device and Method for Receiver Access Control in a
Multicast Communication Network

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APPELLANT'S BRIEF PURSUANT TO 37 C.F.R. § 1.192

This Appellant's brief is hereby submitted in accordance with a Notice of Appeal
filed on November 16, 2006.

I.   Real Party in Interest

The real party in interest is Nortel Networks, Limited.

II.   Related Appeals and Interferences

Appellants are not aware of any appeals or interferences that are related to the present case.

III.   Status of the Claims

This is an appeal brief from a decision by the Primary Examiner dated August 17, 2006, finally rejecting all the claims currently pending in the present application. No claims have been allowed. The currently pending claims are 1-4, 6-15, and 17-57. Claims 5 and 16 were previously cancelled.

The rejections of claims 1-4, 6-15 and 17-57 are the subject of this appeal.

A notice of Appeal was filed on November 16, 2006.

IV.   Status of Amendments

No amendments to the claims were filed after the Final Rejection of August 17, 2006.

V.   Summary of Claimed Subject Matter

Claim 1 sets forth a multicast communication system including subscriber locations, as illustrated in Fig. 1 by subscriber location 140, where each subscriber location has an access device (Fig. 1, 141) through which subscriber

devices access multicast information sent by a multicast distribution device (Fig. 1, 120), wherein each access device acts as a sole multicast receiver for its respective subscriber location and distributes multicast information received from the multicast distribution device to the subscriber devices (Fig. 1, 142) at its respective subscriber location. See Specification at page 6, lines 5 through 22. Claim 1 further sets forth that each access device operates by joining and leaving at least one multicast group as a substitute for the subscriber devices at its respective subscriber location, and that each access device processes a first join request received from one of the subscriber devices by determining whether the access device is already joined to a multicast group indicated by the first join request, and, in the event that the access device is not already joined to the multicast group indicated by the first join request, sending a second join request to the multicast distribution device, where the second join request is a request for said access device to join said multicast group, as illustrated in Fig. 3, including in steps 302, 304, 306, 308, and 310. See also page 6, line 23, through page 7, line 6, and page 8 lines 8 through 17 of the Specification.

Claim 1 further sets forth that the access device does not forward the first join request to said multicast distribution service, and that joining the multicast group by the access device on behalf of the first subscriber device includes authenticating, in response to the second join request, the access device by the multicast distribution device, and wherein the multicast distribution device does not authenticate the subscriber devices, as disclosed on page 8, line 14 through

page 9 line 17 of the Specification, and illustrated by steps 604 through 612 of

Fig. 6.

Claim 2 sets forth that the multicast distribution device distributes

multicast information for a number of multicast groups, and that each access

device uses a predetermined multicast group management protocol to join the

multicast groups on behalf of the subscriber devices at its respective subscriber

location, as disclosed at page 5, lines 14 through 23 of the Specification.

Claim 3 further sets for that the predetermined multicast group

management protocol is an Internet Group Management Protocol (IGMP), as

disclosed at page 4, lines 16 through 19 of the Specification.

Claim 4 sets forth a multicast communication system including a multicast

distribution device coupled to subscriber locations, wherein each subscriber

location is a separate subnetwork of the multicast distribution device, as disclosed

on page 5 of the Specification at lines 24 through 27. Claim 4 further sets forth

that each subscriber location includes one and only one access device through

which subscriber devices at the subscriber location access multicast information

distributed by the multicast distribution device, wherein each access device acts as

a sole multicast receiver for its respective subscriber location and distributes

multicast information received from the multicast distribution device to the

subscriber devices at its respective subscriber location, as described at lines 8

through 27 on page 5 of the Specification.   Claim 4 also sets forth that each

access device operates by joining and leaving at least one multicast group as a

substitute for the subscriber devices at its respective subscriber location, and that

the access device processes a first join request received from one of the

subscriber devices by determining whether the access device is already joined to a

multicast group indicated by the join request, and, in the event that the access

device is not already joined to the multicast group indicated by the join request,

sending a second join request to the multicast distribution device, as illustrated in

Fig. 3 by steps 304 through 312. Claim 4 also sets forth that the second join

request is a request for the access device to join said multicast group, wherein the

access device does not forward the first join request to the multicast distribution

service, wherein joining the multicast group by the access device as a substitute

for the subscriber devices includes authenticating, in response to the second join

request, the access device by the multicast distribution device, and wherein the

multicast distribution device does not authenticate the subscriber devices, as

illustrated in Fig. 6 steps 604 through 608, and the associated text, and also

beginning at line 30 on page 6 through line 6 on page 7.

Claim 6 further sets forth that each access device is coupled to a separate

interface of the multicast distribution device, as disclosed on page 5 in lines 11-

12. Claim 7 sets forth that the multicast distribution device identifies each access

device based upon the interface to which the access device is coupled, as

disclosed on page 8 in lines 21 through 24. Claim 8 further sets forth that each

access device joins multicast groups maintained by the multicast distribution

device on behalf of its respective subscriber devices using a multicast group

management protocol, as disclosed on page 5 in lines 18 through 23.

Claim 9 sets forth that the multicast distribution device sends multicast information to the access devices based upon multicast group memberships of the access devices, and Claim 10 further sets forth that each access device distributes multicast information received from the multicast distribution device to its respective subscriber devices, as disclosed on page 5 of the Specification in lines 21 through 23.

Claim 11 sets forth that the multicast distribution device maintains accounting information for each subnetwork, Claim 12 sets forth that the accounting information includes multicast group memberships for each subnetwork, Claim 13 sets forth that the accounting information includes a duration for each multicast group membership for each subnetwork, and Claim 14 sets forth that the accounting information includes a volume of multicast information for each multicast group membership for each subnetwork, as illustrated by accounting system 110 in Fig. 1 and described in the associated text, including in lines 5 through 12 on page 6 of the Specification, and page 12 line 27 through line 8 on page 13.

Claim 15 sets forth a communication system having a multicast distribution device coupled to subscriber locations, as illustrated in Figs. 8 through 10, each subscriber location having an access device and a plurality of subscriber devices, as shown in Fig. 1. Claim 15 further sets forth that each access device acts as a sole multicast receiver for its respective subscriber location and distributes multicast information received from the multicast distribution device to the subscriber devices at its respective subscriber location, and that each

said access device acts to join and leave at least one multicast group on behalf of the subscriber devices at its respective subscriber location, as set forth at line 6 on page 5 through line 4 on page 6 of the Specification.

Also in Claim 15, access control includes maintaining a number of multicast groups by the multicast distribution device and joining one of the multicast groups by a first subscriber device, wherein the joining includes sending a first join request by the first subscriber device to an access device using a first multicast group management protocol, determining, by the access device, whether the access device is already joined to a multicast group indicated by the join request, in the event that the access device is not already joined to the multicast group indicated by the join request, joining the multicast group by the access device as a substitute for the first subscriber device by sending a second join request to the multicast distribution device, wherein the second join request is a request for the access device to join the multicast group, wherein the access device does not forward the first join request to the multicast distribution service, as illustrated by steps 304 through 310 of Fig. 3, and described beginning at line 23 of page 6 through line 6 on page 7, and line 8 on page 8 through line 4 on page 9 of the Specification.

Claim 15 further sets forth authenticating, in response to the second join request, the access device by the multicast distribution device, and that the multicast distribution device does not authenticate the one of said subscriber devices, as well as associating, in response to the first join request, the first subscriber device with the multicast group by the access device, as disclosed on

page 8, line 14 through page 9 line 17 of the Specification, and illustrated at step

312 of Fig. 3.

Claim 17 sets forth that authenticating the access device by the multicast

distribution device includes identifying the access device by the multicast

distribution device, Claim 18 sets forth that identifying the access device by the

multicast distribution device includes identifying the access device based upon the

interface over which the second join request is received by the multicast

distribution device, and Claim 19 sets forth that authenticating the access device

by the multicast distribution device includes authenticating the access device

using a predetermined authentication scheme, as illustrated by step 606 of Fig. 6,

and described in lines 5 through 17 on page 9.   Claim 20 sets forth that the

predetermined authentication scheme includes IPsec AH, as disclosed in lines 24

through 28 on page 8 of the Specification.

Claim 21 sets forth determining by the multicast distribution device that

the access device is authentic, and establishing a multicast group membership for

the access device by the multicast distribution device, and Claim 22 further sets

forth determining by the multicast distribution device that the access device is not

authentic and denying a multicast group membership for the access device by the

multicast distribution device, as disclosed in lines 3 through 17 on page 9 of the

Specification.

Claim 23 states that associating the first subscriber device with the

multicast group by the access device includes maintaining by the access device a

list of subscriber devices associated with the multicast group, and adding the first

subscriber device to the list of subscriber devices associated with the multicast

group, as illustrated by steps 312 and 314 of Fig. 3, and further disclosed in lines

8 through 20 on page 8 of the Specification.

Claim 24 sets forth leaving the multicast group by the first subscriber

device, leaving the multicast group by the access device on behalf of the first

subscriber device, and disassociating the first subscriber device from the multicast

group by the access device, as illustrated by the steps in Fig. 5 and described in

the text on page 11 in lines 3 through 21. Claim 25 sets forth joining the multicast

group by a second subscriber device, including sending a third join request by the

second subscriber device to the access device using a third multicast group

management protocol and associating, in response to the third join request, the

second subscriber device with the multicast group by the access device, while

Claim 26 sets forth leaving the multicast group by one of the first subscriber

device and the second subscriber device, remaining joined to the multicast group

by the access device on behalf of the remaining subscriber device, and

disassociating one of the first subscriber device and the second subscriber device

from the multicast group by the access device, as disclosed at line 23 of page 10

through line 26 of page 11.

Claim 27 sets forth maintaining accounting information by the multicast

distribution device for each multicast group for each subscriber location, as

disclosed on page 12 line 27 through line 8 on page 13.

Claim 28 sets forth an apparatus for operating as a sole multicast receiver

on behalf of subscriber devices at a subscriber location in a multicast

communication network, including a network interface couplable to a multicast

distribution device, a subscriber interface couplable to the number of subscriber

devices at the subscriber location, and switching logic interposed between the

network interface and the subscriber interface, as illustrated in Fig. 2, and

described at line 7 on page 7 through line 8 on page 8.

Claim 28 further sets forth that the switching logic is operably coupled to

join and leave multicast groups maintained by the multicast distribution device as

a substitute for the subscriber devices at the subscriber location and forward

multicast information to the subscriber devices at the subscriber location, and that

switching logic processes a first join request received from a first one of the

subscriber devices by determining whether the apparatus is already joined to a

multicast group indicated by the join request, and, in the event that the apparatus

is not already joined to the multicast group indicated by the join request, sending

a second join request to said multicast distribution device, wherein the second join

request is a request for said apparatus to join the multicast group, as illustrated in

Fig. and disclosed in line 8 of page 8 through line 4 on page 9 of the

Specification.

Claim 28 further sets forth that the switching logic does not forward the

first join request to the multicast distribution device, and that the joining of the

multicast group by the access device as a substitute for the subscriber devices

includes authenticating, in response to the second join request, the access device

by the multicast distribution device, and wherein the multicast distribution device

does not authenticate the subscriber devices, as disclosed on page 8, line 14

through page 9 line 17 of the Specification, and illustrated by steps 604 through 612 of Fig. 6.

Dependent Claim 29 further sets forth that the switching logic includes first multicast group management logic operably coupled to control first multicast group memberships between the apparatus and the subscriber devices, second multicast group management logic operably coupled to control second multicast group memberships between the apparatus and the multicast distribution device, membership logic operably coupled to maintain the first and second multicast group memberships, and Dependent Claim 30 further sets forth that the first multicast group management logic includes Internet Group Management Protocol (IGMP) logic for exchanging multicast group membership information with the subscriber devices. Dependent Claim 31 further sets forth that the second multicast group management logic includes Internet Group Management Protocol (IGMP) logic for exchanging multicast group membership information with the multicast distribution device. Dependent Claim 32 sets forth that the membership logic is operably coupled to associate the first multicast group memberships with the second multicast group memberships. Dependent Claim 33 further sets forth that the membership logic is operably coupled to maintain a list of subscriber devices for each of the second multicast group memberships. Disclosure for these dependent claims is found at line 12 of page 7 through 7 on page 8 of the Specification.

Dependent Claim 34 sets forth that first multicast group management logic is operably coupled to receive the first join request, dependent claim 35 sets forth

that the second multicast group management logic is operably coupled to join the multicast group instead of the first one of said subscriber devices, and dependent Claim 36 sets forth that the membership logic is operably coupled to associate the first one of the subscriber devices with the multicast group in response to the first join request. This subject matter is disclosed beginning at line 8 of the Specification through line 4 on page 9.

Dependent Claim 37 sets forth that the first multicast group management logic is operably coupled to determine that a subscriber device has left a multicast group, and dependent Claim 38 sets forth that the membership logic is operably coupled to disassociate the subscriber device from the multicast group. Dependent claim 39 sets forth that the second multicast group management logic is operably coupled to determine whether there are any remaining subscriber devices associated with the multicast group based upon the membership information maintained by the membership logic, and dependent Claim 40 sets forth that the second multicast group management logic is operably coupled to remain a member of the multicast group upon determining that there is at least one remaining subscriber device associated with the multicast group. Dependent claim 41 sets forth that the second multicast group management logic is operably coupled to leave the multicast group upon determining that there are no remaining subscriber devices associated with the multicast group. The subject matter of these dependent claims is disclosed at line 3 through line 26 on page 11 of the Specification.

Claim 42 sets forth a computer program for controlling a computer

system, network interface logic for communicating with a multicast distribution

device, as illustrated the network interface 202 of Fig. 200, subscriber interface

logic for communicating with a plurality of subscriber devices at a subscriber

location, as illustrated by the subscriber interface 206 of Fig. 2, and switching

logic logically interposed between the network interface logic and the subscriber

interface logic, as illustrated by the switching logic 204 of Fig. 2. Claim 42

further includes the switching logic being programmed to join and leave multicast

groups maintained by the multicast distribution device as a substitute for the

plurality of subscriber devices and forward multicast information to the plurality

of subscriber devices, as disclosed in the Specification in lines 21 through 25 on

page 7.

Also in Claim 42, the switching logic processes a first join request

received from one of the subscriber devices by determining whether said

switching logic is already joined to a multicast group indicated by the first join

request, and, in the event that the switching logic is not already joined to said

multicast group indicated by said first join request, sending a second join request

to the multicast distribution device, wherein the second join request is a request

for an access device including the switching logic to join said multicast group, as

illustrated by steps 304 through 310 of Fig. 3, and described in lines 8 through 20

on page 8 of the Specification. Claim 42 goes on to set forth that the switching

logic does not forward the first join request to the multicast distribution device,

and that joining the multicast group as a substitute for the subscriber devices

includes authenticating, in response to said second join request, an access device

including the switching logic, network interface logic, and subscriber interface

logic, by said multicast distribution device, and wherein said multicast

distribution device does not authenticate said subscriber devices, as disclosed on

page 8, line 14 through page 9 line 17 of the Specification, and illustrated by steps

604 through 612 of Fig. 6.

Dependent claims 43 through 55 include analogous features to dependent

claims 29 through 41, and are disclosed in the same portions of the Specification

as those claims.

Dependent claim 56 sets for that the computer program of claim 42 is

embodied in a computer readable medium, and dependent claim 57 sets forth that

the computer program of claim 42 embodied in a data signal, as disclosed

beginning at line 5 on page 19 through page 20 line 4.

VI.   Grounds of Rejection to be Reviewed on Appeal

A. Claims 1-4, 6-15, and 17-57 stand rejected as anticipated under 35 U.S.C.

102(b) by United States Patent number 6,097,720 of Araujo et al. ("Araujo et

al.").

VII.   Argument

A. The Examiner has not provided a reference or combination of references

that describes or suggests the claim limitation of *joining a multicast group*

by an access device on behalf of a subscriber device, wherein the joining

includes authenticating the access device by the multicast distribution

device, and wherein the multicast distribution device does not authenticate

the subscriber device, **because** Araujo et al. **includes no mention of**

authentication of any kind, and also because the PPP connections of

Araujo et al. **cited by the Examiner are between both a multicast source**

end station and the receiving end stations, and also between the multicast

source end station and an intermediate device (which is located between

the multicast source end station and the receiving end stations).

It is well established that "[a]nticipation requires the disclosure in a single

prior art reference of each element of the claim under consideration." *W.L. Gore*

& Associates, Inc. v. Garlock, Inc., 721 F.2d 1540, 220 USPQ 303 (Fed. Cir.

1983), *cert. denied*, 469 U.S. 851 (1984). Appellants assert that the rejection of

claims 1-4 and 6-15, and 17-57 under 35 U.S.C. 102 fails to meet this

requirement, since Araujo et al. does not include the claimed limitation of:

". . . wherein said access device does not forward said first join request to said

multicast distribution service, *wherein said joining said multicast group by said*

access device on behalf of said first subscriber device includes authenticating,

in response to said second join request, said access device by said multicast

distribution device, and wherein said multicast distribution device does not

authenticate said one of said subscriber devices", as in each of the independent

claims 1, 4, 15, 28 and 42, from which each of the remaining claims depend. In

contrast, Araujo et al. includes no mention of authentication of any kind, far less

any suggestion of selective authentication as performed by the present

independent claims.

United States Patent number 6,097,720 of Araujo et al.:

The Araujo et al. system enables multicast distribution efficiencies in a

dialup access environment, and includes a multicast source end station, such as a

remote access server for an Internet service provider, and a plurality of multicast

receiving end stations, such as customer premises equipment CPE, coupled to an

intermediate device in the network. In multiple sections, Araujo et al. expressly

and repeatedly teach establishing connections (e.g. point-to-point sessions or

"PPP") both between a source end station and the plurality of receiving end

stations and between the multicast source end station and the intermediate device,

through which the source end station feeds multicast messages to the intermediate

device. See for example Abstract, lines 8-15, column 2, lines 34-42, column 3

lines 27-30, column 6 lines 35-37, and column 6 lines 58-65.

Claims 1-4, 6-15, and 17-57:

Each of the present independent claims 1, 4, 15, 28 and 42 include features

analogous to the following limitation of independent claim 1:

> . . . wherein each said access device processes a first join request received
> from one of said subscriber devices by determining whether said access
> device is already joined to a multicast group indicated by said first join
> request, and, in the event that said access device is not already joined to
> said multicast group indicated by said first join request, sending a second

join request to said multicast distribution device, wherein said second join request is a request for said access device to join said multicast group, wherein said access device does not forward said first join request to said multicast distribution service, wherein said *joining said multicast group by said access device on behalf of said first subscriber device includes authenticating, in response to said second join request, said access device by said multicast distribution device, and wherein said multicast distribution device does not authenticate said one of said subscriber devices* (emphasis added)

At issue is whether the <u>Araujo et al.</u> reference teaches the above highlighted selective authentication approach of the present independent claims, in which an access device joins a multicast group on behalf of a subscriber device, wherein the joining includes authenticating the access device by a multicast distribution device, and wherein the multicast distribution device does not authenticate the subscriber device.

First, it must be recognized that <u>Araujo et al.</u> includes no mention of authentication of any kind. There is no discussion of any need for authentication, or even any suggestion that authentication could potentially be performed, in the teachings of <u>Araujo et al.</u> Accordingly, <u>Araujo et al.</u> therefore also fails to recognize any need for eliminating authentication steps performed between devices, in order to save bandwidth and other resources. In contrast, the selective authentication features of the present independent claims involve joining a multicast group on behalf of a subscriber device including authentication of a multicast distribution device, but advantageously without authentication of the subscriber device. Appellants submit that without any teachings regarding authentication in <u>Araujo et al.</u>, and since the connections taught by <u>Araujo et al.</u> extend between both the multicast source end station and the receiving end

stations of <u>Araujo et al.</u>, and also between the multicast source end station and the intermediate device of <u>Araujo et al.</u>, <u>Araujo et al.</u> does not anticipate the present independent claims.

Specifically, the Examiner has asserted that the use of PPP in the connections of <u>Araujo et al.</u> is sufficient in itself to anticipate the above described selective authentication features of the present independent claims. However, the Examiner's rejections include no indication of whether the Examiner views the approach to authentication taken in the present independent claims as inherent or implicit in <u>Araujo et al.</u>, or that any portion of <u>Araujo et al.</u> even suggests that optional authentication features of PPP should somehow be employed in the <u>Araujo et al.</u> system. In this regard the Examiner has simply stated that "PPP connections feature authentication if desired".

While Appellants concur that authentication is an optional feature that may be employed in PPP, there is no teaching in <u>Araujo et al.</u> towards the use of authentication in the PPP connections disclosed in <u>Araujo et al.</u>, far less any hint or suggestion of any possible selective application of authentication to certain PPP connections and not others. Appellants specifically note that even where <u>Araujo et al.</u> discusses in some detail the features and operation of PPP (i.e. between line 62 of column 4 and column 5 line 27), <u>Araujo et al.</u> makes no reference to using the authentication capabilities of PPP connections within the <u>Araujo et al.</u> system. Accordingly, a person skilled in the art could not be instructed by the teachings of <u>Araujo et al.</u> that the use of PPP's authentication

features was in any way a desirable enhancement or modification to the

connections taught therein.

Moreover, even if the optional authentication features of PPP were to be

applied to the connections in Araujo et al., and Appellants make no admission that

there is any motivation found in the prior art for such a modification of Araujo et

al., there is still no reason that such authentication would be applied in the exact

manner of the above highlighted features of the present claims. Specifically, there

is nothing outside of the present independent claims, either in Araujo et al. or

elsewhere (including in RFC 1661), that suggests the selective approach to

authentication in response to a join request found in the present independent

claims.

The Examiner's statements point only to the possibility of modifying

Araujo et al. to match the present independent claims, without identifying any

teaching in the prior art that discloses any hint or suggestion of the desirability of

such modifications. The Examiner states that "no authentication need occur

between the end stations (subscriber devices) and the intermediate device (access

device)". Appellants respectfully urge that the fact that a prior art reference could

potentially be modified in a way that matches a claim is not a proper basis for

rejecting that claim. Moreover, the Examiner's assertions that Araujo et al. could

be modified in the manner of the present independent claims is made with the

benefit of knowledge of the present independent claims themselves, but without

any support in the teachings of the prior art. Appellants must accordingly

respectfully urge that the present rejections based on this logic are founded on impermissible hindsight.

For the above reasons, Appellants respectfully urge that <u>Araujo et al.</u> does not disclose or suggest all the features of the present independent claims 1, 4, 15, 28 and 42. Accordingly, <u>Araujo et al.</u> does not anticipate the present independent claims under 35 U.S.C. 102. As to the remaining claims, they each depend from either claim 1, 4, 15, 28 or 42, and are believed to be patentable over <u>Araujo et al.</u> for at least the same reasons.

VIII. <u>Conclusion</u>

Appellants submit therefore that the rejections of the present claims under 35 U.S.C. and 102 based on <u>Araujo et al.</u> are improper for at least the reasons set forth above. Appellants accordingly request that the rejections be withdrawn and the pending claims be allowed.

Respectfully submitted,

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Appendix A - Claims

1. (previously presented) A multicast communication system comprising a plurality of subscriber locations, each subscriber location having an access device through which a plurality of subscriber devices access multicast information sent by a multicast distribution device, wherein each access device acts as a sole multicast receiver for its respective subscriber location and distributes multicast information received from the multicast distribution device to the subscriber devices at its respective subscriber location, wherein each said access device operates by joining and leaving at least one multicast group as a substitute for the subscriber devices at its respective subscriber location, and wherein each said access device processes a first join request received from one of said subscriber devices by determining whether said access device is already joined to a multicast group indicated by said first join request, and, in the event that said access device is not already joined to said multicast group indicated by said first join request, sending a second join request to said multicast distribution device, wherein said second join request is a request for said access device to join said multicast group, wherein said access device does not forward said first join request to said multicast distribution service, wherein said joining said multicast group by said access device on behalf of said first subscriber device includes authenticating, in response to said second join request, said access device by said multicast distribution device, and wherein said multicast distribution device does not authenticate said one of said subscriber devices.

2. (previously presented) The multicast communication system of claim 1, wherein the multicast distribution device distributes multicast information for a number of multicast groups, and wherein each access device uses a predetermined multicast group management protocol to join the multicast groups on behalf of the subscriber devices at its respective subscriber location.

3. (original) The multicast communication system of claim 2, wherein the predetermined multicast group management protocol is an Internet Group Management Protocol (IGMP).

4. (previously presented) A multicast communication system comprising a multicast distribution device coupled to a plurality of subscriber locations, wherein each subscriber location is a separate subnetwork of the multicast distribution device, wherein each subscriber location comprises one and only one access device through which a plurality of subscriber devices at the subscriber location access multicast information distributed by the multicast distribution device, wherein each access device acts as a sole multicast receiver for its respective subscriber location and distributes multicast information received from the multicast distribution device to the subscriber devices at its respective subscriber location, and wherein each said access device operates by joining and leaving at least one multicast group as a substitute for the subscriber devices at its respective subscriber location, and wherein said access device processes a first join request received from one of said subscriber devices by determining whether said access device is already joined to a multicast group indicated by said join request, and, in the event that said access device is not already joined to said multicast group indicated by said join request, sending a second join request to said multicast distribution device, wherein said second join request is a request for said access device to join said multicast group, wherein said access device does not forward said first join request to said multicast distribution service, wherein said joining said multicast group by said access device as a substitute for the subscriber devices includes authenticating, in response to said second join request, said access device by said multicast distribution device, and wherein said multicast distribution device does not authenticate said subscriber devices.

5. (cancelled)

6. (previously presented) The multicast communication system of claim 1, wherein each access device is coupled to a separate interface of the multicast distribution device.

7. (original) The multicast communication system of claim 6, wherein the multicast distribution device identifies each access device based upon the interface to which the access device is coupled.

8. (original) The multicast communication system of claim 6, wherein each access device joins multicast groups maintained by the multicast distribution device on behalf of its respective subscriber devices using a multicast group management protocol.

9. (original) The multicast communication system of claim 8, wherein the multicast distribution device sends multicast information to the access devices based upon multicast group memberships of the access devices.

10. (original) The multicast communication system of claim 8, wherein each access device distributes multicast information received from the multicast distribution device to its respective subscriber devices.

11. (original) The multicast communication system of claim 4, wherein the multicast distribution device maintains accounting information for each subnetwork.

12. (original) The multicast communication system of claim 11, wherein the accounting information comprises multicast group memberships for each subnetwork.

13. (original) The multicast communication system of claim 12, wherein the accounting information comprises a duration for each multicast group membership for each subnetwork.

14. (original) The multicast communication system of claim 12, wherein the accounting information comprises a volume of multicast information for each multicast group membership for each subnetwork.

15. (previously presented) In a communication system having a multicast distribution device coupled to a plurality of subscriber locations, each subscriber location having an access device and a plurality of subscriber devices, wherein each access device acts as a sole multicast receiver for its respective subscriber location and distributes multicast information received from the multicast distribution device to the subscriber devices at its respective subscriber location, and wherein each said access device acts to join and leave at least one multicast group on behalf of the subscriber devices at its respective subscriber location, an access control method comprising:

maintaining a number of multicast groups by the multicast distribution device; and

joining one of said number of multicast groups by a first subscriber device, wherein joining one of said number of multicast groups by the first subscriber device comprises:

sending a first join request by the first subscriber device to an access device using a first multicast group management protocol;

determining, by said access device, whether said access device is already joined to a multicast group indicated by said join request; in the event that said access device is not already joined to said multicast group indicated by said join request, joining the multicast group by the access device as a substitute for the first subscriber device by sending a second join request to said multicast distribution device, wherein said second join request is a request for said access device to join said multicast group, wherein said access device does not forward said first join request to said multicast distribution service, and authenticating, in response to said second join request, said access device by said multicast distribution device, and wherein said multicast distribution device does not authenticate said one of said subscriber devices; and

associating, in response to said first join request, the first subscriber device with the multicast group by the access device.

16. (canceled)

17. (previously presented) The access control method of claim 15 , wherein authenticating the access device by the multicast distribution device comprises:

identifying the access device by the multicast distribution device.

18. (original) The access control method of claim 17, wherein the access device is coupled to an interface of the multicast distribution device, and wherein identifying the access device by the multicast distribution device comprises:

identifying the access device based upon the interface over which the second join request is received by the multicast distribution device.

19. (previously presented) The access control method of claim 15 , wherein authenticating the access device by the multicast distribution device comprises:

authenticating the access device using a predetermined authentication scheme.

20. (original) The access control method of claim 19, wherein the predetermined authentication scheme comprises IPsec AH.

21. (previously presented) The access control method of claim 15 , further comprising:

determining by the multicast distribution device that the access device is authentic;
and

establishing a multicast group membership for the access device by the multicast distribution device.

22. (previously presented) The access control method of claim 15 , further comprising:

determining by the multicast distribution device that the access device is not authentic; and

denying a multicast group membership for the access device by the multicast distribution device.

23. (original) The access control method of claim 15, wherein associating the first subscriber device with the multicast group by the access device comprises:

maintaining by the access device a list of subscriber devices associated with the multicast group; and

adding the first subscriber device to the list of subscriber devices associated with the multicast group.

24. (original) The access control method of claim 15, further comprising:

leaving the multicast group by the first subscriber device;

leaving the multicast group by the access device on behalf of the first subscriber device; and

disassociating the first subscriber device from the multicast group by the access device.

25. (previously presented) The access control method of claim 15, further comprising:

joining the multicast group by a second subscriber device, wherein joining the multicast group by the second subscriber device comprises:

sending a third join request by the second subscriber device to the access device using a third multicast group management protocol; and

associating, in response to the third join request, the second subscriber device with the multicast group by the access device.

26. (original) The access control method of claim 25, further comprising:

leaving the multicast group by one of the first subscriber device and the second subscriber device;

remaining joined to the multicast group by the access device on behalf of the remaining subscriber device; and

disassociating said one of the first subscriber device and the second subscriber device from the multicast group by the access device.

27. (original) The access control method of claim 15, further comprising:

maintaining accounting information by the multicast distribution device for each multicast group for each subscriber location.

28. (previously presented) An apparatus for operating as a sole multicast receiver on behalf of a plurality of subscriber devices at a subscriber location in a multicast communication network, the apparatus comprising:

a network interface couplable to a multicast distribution device;

a subscriber interface couplable to the number of subscriber devices at the subscriber location; and

switching logic interposed between the network interface and the subscriber interface, wherein the switching logic is operably coupled to join and leave multicast groups maintained by the multicast distribution device as a substitute for the plurality of subscriber devices at the subscriber location and forward multicast information to the subscriber devices at the subscriber location, and wherein said switching logic processes a first join request received from a first one of said subscriber devices by determining whether said apparatus is already joined to a multicast group indicated by said join request, and, in the event that said apparatus is not already joined to said multicast group indicated by said join request, sending a second join request to said multicast distribution device, wherein said second join request is a request for said apparatus to join said multicast group, wherein said switching logic does not forward said first join request to said multicast distribution device, and wherein said joining said multicast group by said access device as a substitute for the subscriber devices includes authenticating, in response to said second join request, said access device by said multicast distribution device, and wherein said multicast distribution device does not authenticate said subscriber devices.

29. (original) The apparatus of claim 28, wherein the switching logic comprises:

first multicast group management logic operably coupled to control first multicast group memberships between the apparatus and the subscriber devices;

second multicast group management logic operably coupled to control second multicast group memberships between the apparatus and the multicast distribution device; and

membership logic operably coupled to maintain said first and second multicast group memberships.

30. (original) The apparatus of claim 29, wherein the first multicast group management logic comprises Internet Group Management Protocol (IGMP) logic for exchanging multicast group membership information with the subscriber devices.

31. (original) The apparatus of claim 29, wherein the second multicast group management logic comprises Internet Group Management Protocol (IGMP) logic for exchanging multicast group membership information with the multicast distribution device.

32. (original) The apparatus of claim 29, wherein the membership logic is operably coupled to associate the first multicast group memberships with the second multicast group memberships.

33. (original) The apparatus of claim 29, wherein the membership logic is operably coupled to maintain a list of subscriber devices for each of said second multicast group memberships.

34. (previously presented) The apparatus of claim 29, wherein the first multicast group management logic is operably coupled to receive the first join request .

35. (previously presented) The apparatus of claim 34, wherein the second multicast group management logic is operably coupled to join the multicast group instead of the first one of said subscriber devices .

36. (previously presented) The apparatus of claim 34, wherein the membership logic is operably coupled to associate the first one of the subscriber devices with the multicast group in response to the first join request.

37. (original) The apparatus of claim 29, wherein the first multicast group management logic is operably coupled to determine that a subscriber device has left a multicast group.

38. (original) The apparatus of claim 37, wherein the membership logic is operably coupled to disassociate the subscriber device from the multicast group.

39. (original) The apparatus of claim 38, wherein the second multicast group management logic is operably coupled to determine whether there are any remaining subscriber devices associated with the multicast group based upon the membership information maintained by the membership logic.

40. (original) The apparatus of claim 39, wherein the second multicast group management logic is operably coupled to remain a member of the multicast group upon determining that there is at least one remaining subscriber device associated with the multicast group.

41. (original) The apparatus of claim 39, wherein the second multicast group management logic is operably coupled to leave the multicast group upon determining that there are no remaining subscriber devices associated with the multicast group.

42. (previously presented) A computer program for controlling a computer system, the computer program comprising:

       network interface logic for communicating with a multicast distribution device;

       subscriber interface logic for communicating with a plurality of subscriber devices at a subscriber location; and

       switching logic logically interposed between the network interface logic and the subscriber interface logic, wherein the switching logic is programmed to join and leave

multicast groups maintained by the multicast distribution device as a substitute for the plurality of subscriber devices and forward multicast information to the plurality of subscriber devices, and wherein said switching logic processes a first join request received from one of said subscriber devices by determining whether said switching logic is already joined to a multicast group indicated by said first join request, and, in the event that said switching logic is not already joined to said multicast group indicated by said first join request, sending a second join request to said multicast distribution device, wherein said second join request is a request for an access device including said switching logic to join said multicast group, wherein said switching logic does not forward said first join request to said multicast distribution device, and wherein said joining said multicast group as a substitute for the subscriber devices includes authenticating, in response to said second join request, an access device including said switching logic, said network interface logic, and said subscriber interface logic, by said multicast distribution device, and wherein said multicast distribution device does not authenticate said subscriber devices.

43. (original) The computer program of claim 42, wherein the switching logic comprises:

first multicast group management logic programmed to control first multicast group memberships between the computer system and the subscriber devices;

second multicast group management logic programmed to control second multicast group memberships between the computer system and the multicast distribution device; and

membership logic programmed to maintain said first and second multicast group memberships.

44. (original) The computer program of claim 43, wherein the first multicast group management logic comprises Internet Group Management Protocol (IGMP) logic for exchanging multicast group membership information with the subscriber devices.

45. (original) The computer program of claim 43, wherein the second multicast group management logic comprises Internet Group Management Protocol (IGMP) logic for exchanging multicast group membership information with the multicast distribution device.

46. (original) The computer program of claim 43, wherein the membership logic is programmed to associate the first multicast group memberships with the second multicast group memberships.

47. (original) The computer program of claim 43, wherein the membership logic is programmed to maintain a list of subscriber devices for each of said second multicast group memberships.

48. (previously presented) The computer program of claim 43, wherein the first multicast group management logic is programmed to receive the first join request .

49. (previously presented) The computer program of claim 48, wherein the second multicast group management logic is programmed to join the multicast group instead of said one of said subscriber devices.

50. (previously presented) The computer program of claim 48, wherein the membership logic is programmed to associate said one of said subscriber devices with the multicast group in response to said first join request.

51. (original) The computer program of claim 43, wherein the first multicast group management logic is programmed to determine that a subscriber device has left a multicast group.

52. (original) The computer program of claim 51, wherein the membership logic is programmed to disassociate the subscriber device from the multicast group.

53. (original) The computer program of claim 52, wherein the second multicast group management logic is programmed to determine whether there are any remaining subscriber devices associated with the multicast group based upon the membership information maintained by the membership logic.

54. (original) The computer program of claim 53, wherein the second multicast group management logic is programmed to remain a member of the multicast group upon determining that there is at least one remaining subscriber device associated with the multicast group.

55. (original) The computer program of claim 53, wherein the second multicast group management logic is programmed to leave the multicast group upon determining that there are no remaining subscriber devices associated with the multicast group.

56. (original) The computer program of claim 42 embodied in a computer readable medium.

57. (original) The computer program of claim 42 embodied in a data signal.

Appendix B - Evidence Submitted

None.

Appendix C - Related Proceedings

None.